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CURRENT STATUS OF THE SOUTHERN PINE BEETLE AND
POST-SUPPRESSION EVALUATION IN THE RED DIRT STUDY AREA,
KISATCHIE NATIONAL FOREST

U. S. Forest Service
Pineville, Louisiana

U. S. DEPARTMENT OF AGRICULTURE -- FOREST SERVICE
SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
RESOURCE PROTECTION UNIT, FOREST INSECT AND DISEASE MANAGEMENT GROUP

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POST-SUPPRESSION EVALUATION IN THE RED DIRT STUDY AREA,
KISATCHIE NATIONAL FOREST

by

Daniel B. Twardus

INTRODUCTION

On January 20, 1977, a biological evaluation was conducted within the Red Dirt Study Area on the Kisatchie National Forest (Fig. 1). This area includes part of a game management area, the Longleaf Trail Vista, the Kisatchie Hills Scenic Area, and is a high-use recreation area. Because the area was once proposed as a wilderness area, and because of its high recreational value, management decisions including SPB control, must be carefully evaluated. Development of a unit plan for this area is currently in progress. The purpose of the evaluation was to 1) determine the status of SPB losses in relation to suppression efforts that have been undertaken, 2) evaluate suppression efforts, and 3) determine if further suppression is warranted.

The aerial phase of the evaluation was conducted jointly by Forest Insect & Disease Management, the Kisatchie Ranger District of the Kisatchie National Forest, and the Southern Forest Experiment Station. On-site examination was conducted by FI&DM.

The last biological evaluation (Twardus 1976) conducted on this area was October 1, 1976. At that time, the extent of the losses included 34 spots with an estimated 1,082 infested trees.

Infestations ranged from single trees to those with at least 200 actively infested trees. It was recommended in the last report that salvage removal be initiated.

Since the last report, nearly 570 MBF and 103 CCF of timber have been salvaged from the area. These volumes included noninfested green trees located in the buffer strips. Salvage removal was accomplished with close operator supervision by personnel in the Kisatchie Ranger District. This insured that all marked trees were removed and that no actively-infested trees escaped removal.

Due to the nature of the area, discussed above, salvage removal was not done on all infestations in the area. Two very large

RED DIRT STUDY AREA
KISATCHIE NATIONAL FOREST

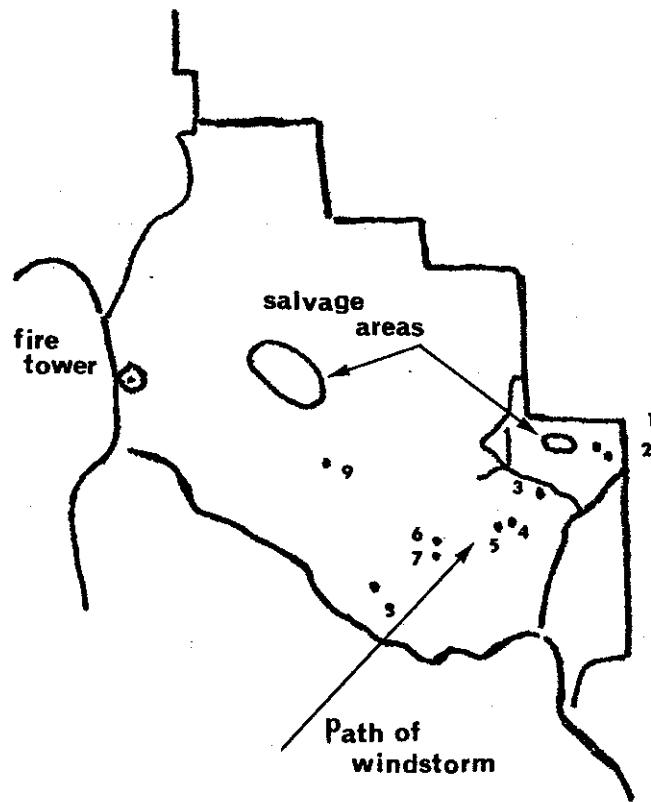


Figure 1. Location of SPB infestations (January 1977), salvaged areas, and path of windstorm.



infestations in the northwestern part of the area were salvaged, as were three small spots in the eastern part of the area.

METHODS

Standard aerial sketch-map procedures were used for this evaluation. Aerial coverage was 100%. The aerial phase covered the entire District as well as the area of concern. Aerial survey results were not corrected for observer error. All spots were examined on the ground to determine the cause of tree mortality, number of trees affected, and general condition of the beetle population.

Two salvage sites were examined for effectiveness of suppression procedures.

TECHNICAL INFORMATION

Causal agent - *Dendroctonus frontalis*, Zimmerman (SPB) - The southern pine beetle entered these stands as a result of pre-disposing wind damage.

Host Trees Attacked - The southern pine beetle attacks all species of southern yellow pine. On this forest, however, loblolly pine, *Pinus taeda* L., and shortleaf pine, *Pinus echinata* Mill., are the preferred hosts.

Type of Damage - Damage caused by the southern pine beetle is tree mortality resulting from adult beetles constructing egg galleries in the cambial region of the host trees. Blue-staining fungi, *Ceratocystis* spp., introduced by the causal agent, other bark beetles, and secondary insects, accelerate the kill and reduce the salvage value.

Life Cycle of the Insect - The beetles attack in pairs and construct winding egg galleries in the cambium. Eggs are deposited along the galleries. Eggs hatch into whitish grubs that further mine the cambium and then construct pupal cells in the outer bark. After transforming to adults, the beetles emerge. During the warmer months, the life cycle is completed in about 30 days. There may be as many as seven generations produced each year.

RESULTS AND DISCUSSION

Current Status of Beetle Losses - Results of this evaluation are summarized in Table 1. There are currently nine separate infestations containing an estimated volume of 150 MBF of sawtimber and 25 CCF of pulpwood. These estimates do not include buffer strips. A number of the infestations reported in the October 1976 evaluation

Table 1. Summary of the results of the SPB evaluation conducted on the Red Dirt Study Area, Kisatchie National Forest

	Ownership Unit
	Kisatchie N.F. Wilderness Study Area
1. Results compiled from data collected during the aerial phase of the evaluation:	
Survey type	Aerial sketch map
Date of aerial survey	1/20/77
Percent survey	100%
Total acreage surveyed (Kisatchie Ranger District)	175,639
Total acreage for this evaluation (Red Dirt Area)	10,240
Total acreage of Forest Service lands, Red Dirt Area.	10,240
Susceptible host type, Red Dirt Area	9,841
Total number of spots, Red Dirt Area	9
Total number of spots, Forest Service lands, Red Dirt Area	9
Spots per M acre of host type	1
Average spot size (trees), Forest Service lands, Red Dirt Area	100
Range of spot size, Forest Service lands, Red Dirt Area	50-200
2. Results compiled from data collected during the ground phase of the evaluation:	
Date of ground phase	1/21/77
Average number of infested trees per spot	37
Total volume of infested trees, Forest Service lands, Red Dirt Area	45 MBF
Total volume affected, Forest Service lands, Red Dirt Area	162 MBF

as separate small infestations appear to have coalesced into large spots. All of the present infestations are in some way associated with wind damage. Figure 1 shows the location of the infestations and the path of a previous windstorm.

The ratio of infested to vacated trees was found to be .32:1, overall. Very few green-infested trees were evident at any of the infestations. These conditions may indicate a general decline in population vigor or the tendency last fall for emerging beetles to disperse to other pines some distance away, which have not yet begun to fade. Red and fading trees examined at all infestation sites showed emergence as evidenced by the abundance of exit holes. But again, evidence of recent attacks was not present.

Red and fading trees examined usually showed that the brood had already emerged. When brood was present, it was in the late larval to callow adult stages. Green-infested trees examined had late-larval brood stages.

Beetle mortality due to excessive cold temperatures for this area was not apparent in the overwintering population. In fact, during the two-day period the evaluation was conducted, broods were found to be active.

Temperature records maintained by the Natchitoches City Power Plant in Natchitoches (about 18 miles from the Red Dirt area) indicate that temperatures did not drop low enough to affect SPB brood survival. The average minimum temperature for December 1976 recorded at the power plant was 34° F., with the lowest recorded temperature being 27° F. The average minimum temeprature for January 1977 was 28° F., with the lowest temperature being 14° F.

The following discussion refers to Figure 1.

Spots 1, 3: These infestations show indications of decreasing activity. This is primarily based upon the low infested to vacated ratios (.28:1 for both) and the fact that the pine BA within the infestation is less at the active portion (80 sq ft/ac) than at the infestation origin (100 sq ft/ac). The significance of decreasing pine BA within the spot is that as the average spacing increases, the synchrony between attack and emergence within the spot is more easily interrupted (Gara, 1967). The relationship between the number of active trees and spot growth is readily apparent. Spots with large beetle populations have a higher probability of growing than spots with few active trees (Hedden, unpubl.).

Spot 2: This infestation also appears to be in decline. The infested to vacated ratio is .08:1. The low pine BA at the active

portion of the spot (60 sq ft/ac) and the low percent pine within the stand (70%) are contributing to the decline in activity of the infestation.

Spots 4, 5, 6, 7, and 8: These infestations are located in stream terraces. The average infested to non-infested ratio for these infestations is .36:1. Pine BA (averaging 100 sq ft/ac within these infestations is not decreasing towards the active portion of the spots. These infestations will most likely continue to increase in size if left uncontrolled.

Spot 9: This infestation is also located in a stream terrace. It is, however, largely surrounded by stands containing longleaf pine. The infested to vacated ratio for this spot is .6:1. Pine BA within the infestation and in the adjacent stands is uniform (110 sq ft/ac). This spot will probably grow in size if left uncontrolled. The infestation should, however, remain within the stream terrace.

The wind damage apparent in all of the infestations appears to have been the direct predisposing cause of beetle outbreak in the area. Recently damaged or killed timber is often a starting point for bark beetle outbreaks.

SPB control success is dependent upon 1) reducing beetle numbers and 2) application of forest management and silvicultural procedures which eliminate or modify predisposing causes of outbreak conditions. The more important stand conditions related to beetle outbreak are:

- 1) recently killed trees, such as slash; damaged trees, such windfalls, ice damage, etc.
- 2) overmature trees
- 3) stands which are too dense or stagnated. This relates to a critical distance between trees beyond which attack will not switch from infested to adjacent non-infested trees. A distance of 15 - 20 ft has been implicated (Gara and Coster, 1968). A 15 ft spacing of trees with an average d.b.h. of 10" is approximately 106 ft² pine BA per acre. In east Texas, Hedden (unpubl.) found that spots with less than about 120 ft² of pine per acre were inactive or going inactive.

Post Suppression Evaluation - Two salvage areas in the Red Dirt area were examined. The first area, located off the Derry-Gorum Road, had some actively infested pulp and slash scattered throughout. Also six actively-infested green trees were found along the border

of the salvage operation. District personnel were aware of these active trees and planned to remove them.

The second salvage area examined was located near the Red Dirt Fire Tower. Removal of infested material from this area was generally complete except for some sawtimber, the removal of which was delayed due to bad weather conditions. No infested trees were observed along the salvage borders.

District personnel reported that a 50 - 70' buffer strip was included around each salvaged infestation.

One area was observed in which infested sawtimber was removed, but for some reason, infested pulpwood was cut but not removed from the stand. Beetles emerging from this area will disperse and initiate new infestations.

RECOMMENDATIONS

1. The most effective control of the southern pine beetle can be achieved at this time by salvage removing all infested trees. Infested non-merchantable material should be felled and chemically treated or burned. This is in accordance with the project control plan for the Kisatchie National Forest.

The large amount of emergence which appears to have taken place from the infestations and the lack of fresh attacks around most of the infestations tend to indicate that the beetle population has and will be dispersed to new areas. This will result in a number of new infestations appearing this summer, even if all present spots are controlled.

2. If a minimum amount of control effort is desired in the area (due to the special management requirements), selective control can be initiated on those infestations not likely to collapse (see discussion). Control can be delayed on those infestations that appear in decline unless signs of new attack are observed.

Spots 4, 5, 6, 7, 8, and 9 do not show signs of decline. Spots 1 and 3 appear to be in decline. Spot 2 appears to be in rapid decline.

3. Salvage storm-damaged timber. When bark beetle populations in the area are in outbreak conditions, do not let storm-damaged timber serve as focal points for SPB infestations.

REFERENCES

Hedden, R. L. 1976. Southern pine beetle summer spot growth and inactivity: A status report (unpubl.).

Gara, R. I. 1967. Studies on the attack behavior of the southern pine beetle. I. The spreading and collapse of outbreaks. Boyce Thompson Inst. Contrib. 23:349-354.

_____, and J. E. Coster. 1968. Studies on the attack behavior of the southern pine beetle. III. Sequence of tree infestations within stands. Contrib. Boyce Thompson Inst. 24:77-86.

Twardus, D. B. 1976. Evaluation of southern pine beetle infestations in the Red Dirt area, Kisatchie National Forest. USDA, For. Serv., SA, S&PF, Resource Protection Unit, FI&DM, Rpt. No. 76-2-23.